

## **Ozarks Stream Fisheries Produce Abundant Energy Resources**



Fuel is plentiful in the Ozarks and stream anglers are reaping the benefits! If you visited the gas pump this morning you might be confused by this bold proclamation. To clarify, I'm not referring to the fuel that gets you to your favorite stream, but rather the one that makes your fishing trip worthwhile. A recent Missouri Department of Conservation study concludes that the main energy source for our most highly prized stream sport fish is crayfish. And, when Ozarks streams remain clean and healthy, as many of them are now, crayfish populations thrive.

In recent years, biologists have learned much about managing smallmouth bass and goggle-eye (rock bass), including the benefits of special regulation areas designed to produce more and bigger fish. With experience, we realized that managing the fish's surrounding environment, including habitat and food sources, was equally important. In the early 1990s we began a study of smallmouth bass and goggle-eye diets, and the possible effects of special regulation areas on the forage base. During our 11 year study on the Jacks Fork (smallmouth bass special regulation area) and Big Piney (goggle-eye special regulation area) rivers, we examined the stomach contents of over 25,000 fish! While some of the study results simply confirmed what biologists and anglers already believed, other results surprised us.

Any Ozarks stream angler worth his or her salt knows that bass can hardly resist a meal of crayfish, but even experienced anglers might be surprised at what we found. Crayfish consistently made up 61 to 63% of smallmouth bass diets and 78% of goggle-eye diets in both rivers and across all study years! These clawed crustaceans were the major food for both fish species in spring, summer and autumn, with the fewest being eaten in spring. Our study did not include winter sampling. Medium-sized crayfish were eaten more often than small and large.

Juvenile fish ate fewer crayfish, but once smallmouths reached 7 inches in length and goggle-eyes grew to 4 inches, crayfish became and remained their main source of energy for life. In other words, crayfish fueled the smallmouth bass and goggle-eye fisheries of these two Ozarks streams for the entire decade.

Jacks Fork and Big Piney river sport fish spiced up their diets with a little variety. Smallmouth bass consumed a fair amount of fish (23% of diet) and insects (10%). Goggle-eye preferred insects (13%) over fish (3%). Insects were most important to the youngest fish of both species.

Minnows were the primary fish and mayflies and stoneflies were the most common insects consumed by both species. It is important to note, as many fly-fisherman know, that mayflies and stoneflies are among the most sensitive insects to water pollution and habitat degradation such as sedimentation. These study results suggest that such stream problems will impact important food sources for the smallest members of the sport fish community and thereby damage future fisheries.

Predators often control prey densities in many natural communities. In fact, biologists have expressed concern that management actions that increase abundance and size

structure of sport fish populations may also indirectly decrease prey populations. Despite noticeable (but only moderate) increases in sport fish abundance in the special regulation reaches of Jacks Fork and Big Piney rivers we did not detect any decreases in crayfish densities or any changes in smallmouth bass or goggle-eye diet patterns.

These results were not surprising. Ozarks stream crayfish densities are among the highest recorded anywhere in the world. Also, crayfish populations are recognized for their ability to withstand substantial levels of predation and compensate with increased reproduction. Biologists warn, however, that this resilience is possible only when high quality habitat exists.

This was the first attempt anywhere to enact stream fishery harvest regulations and attempt to measure effects on sport fish and their prey base. With time, we may see these Jacks Fork River smallmouth bass and Big Piney River goggle-eye fisheries reach their potential. When that occurs, it will be important that adequate stream habitat and water quality are maintained. Such vigilance by fishery managers, anglers and other concerned citizens will help insure that our important Ozarks stream energy reserves, abundant crayfish, continue to supply plenty of fuel to power our prized fisheries.